

d) Remarks

The claims are 21-32, with claims 21 and 22 being independent. Claims 21, 22, 24, 25, 29 and 30 have been amended. Claims 24, 25, 29 and 30 have been amended to resolve formal errors not related to patentability. Claims 21 and 22 have been amended to correct typographical errors not related to patentability and also to define still more clearly what Applicants regard as their invention. No new matter has been added.

The objection to the replacement paragraph at page 8, line 15 has been resolved as requested. The informality at page 14, line 25 has been resolved by a corrective amendment as requested.

With regard to the objections to claims 21-32 under 35 U.S.C. §112, second paragraph, claims 21, 24, 25, 29 and 30 have been amended to correct the informalities therein.

Claims 21 and 28 were deemed informal on the ground that compounds (CT-6) and (CT-8) are allegedly outside the term "triphenylamine." That objection is respectfully traversed.

A triphenylamine compound is an amine group bonded to three phenyl moieties. The amine nitrogen atoms in compounds (CT-6) and (CT-8) of the instant invention are bonded to three phenyl moieties. One phenyl moiety is part of a fluorenyl group. A fluorenyl group is a type of fused phenyl moiety. Thus, claims 21 and 28 are definite with regard to compounds (CT-6) and (CT-8) because they are within the previously recited limitation "triphenylamine."

Claims 21-32 were rejected as being obvious over Ohkubo (US 5,430,526) combined with Sasaki (US 4,859,556), Yamasaki (US 6,242,648) or Kikuchi (US

5,098,809). These rejections were set forth in paragraphs 10 - 13 of the Official Action dated December 2, 2002, Paper No. 8. The grounds of rejection are respectfully traversed.

Prior to addressing the grounds of rejection, Applicants wish to briefly review certain key features and advantages of the present claimed invention. Applicants have developed a process cartridge or electrophotographic apparatus employing an electrophotographic photosensitive member of the present invention and a contact charging means. The electrophotographic member employs a specific charge transfer material, CT 1, 3, 5, 6, 8 or 9 which is synthesized from an amine compound and an aryl halide in the presence of a specific phosphine compound and a palladium compound. The phosphine compound has at least one aryl group and at least one tert-butyl group.

The present claimed invention employs a contact charger, which, in contrast to corona charging, can readily cause electric retrogradation of an electrophotographic photosensitive member because the contact charging means physically touches the electrophotographic photosensitive member. Contact charging can be damaging to a photosensitive member. For example, potential transfer, in particular the dark space potential charge of the photosensitive member, tends to increase. Further, since the contact charger may not be completely uniform in constitution and can be degraded by use, there can be "hot spots" where current transfer is exceptionally high. This tends to cause pinholing of the photosensitive member. Further, the photosensitive member must resist the frictional forces engendered by the contact charger on the surface of the photosensitive member.

Corona charging, however, is an entirely different kind of charging, operating by different scientific principles and creating different problems for the

photosensitive member. In corona charging, for example, a space charge is established by boiling off electrons from a corona wire. There is no contact between the corona charger and the photosensitive member. Therefore, there are no problems regarding pin-holing or functional degradation. However, new and different problems are created.

In corona charging, ozone, nitrogen oxides and other deleterious products resulting from air interaction with electrons are created. These reactive compounds can act to degrade the photosensitive member. Further, charge transfer is different from that in contact charging since a space charge, not a direct charge, is transferred to the photosensitive member.

The art has recognized these differences in charging. In Ohkubo '526, it is disclosed that contact charging is advantageous over corona charging in that voltage source potential is reduced, corona discharge products are reduced, a simple structure is sufficient and higher printing speeds are possible. See Cols. 1 and 2 of Ohkubo.

With regard to the merits of the art rejection, Ohkubo discloses a process cartridge and an electrophotographic apparatus employing contact charging (using a charging roller). Ohkubo, however, admittedly does not disclose the triphenylamine compound that is represented by the formula (CT-1), (CT-3), (CT-5), (CT-6), (CT-8), or (CT-9) of the instant invention and does not synthesize these compounds by the specific synthesis method of the instant invention.

The defects of Ohkubo are not remedied by the secondary references, Sasaki, Yamasaki or Kikuchi. Initially, the rejection of Ohkubo and Yamasaki has been rendered moot by the deletion of CT-11 which is said to correspond to Example 6 and Synthetic Example 1 of Yamasaki.

It will be shown that the combination of Ohkubo with either Sasaki or Kikuchi does not raise a prima facie case of obviousness. Further, it will be shown that there is no motivation to combine Ohkubo with either Sasaki or Kikuchi. Finally, it will be demonstrated that the unexpected superiority of the present claimed invention rebuts any possible presumption of prima facie obviousness.

Sasaki and Kikuchi disclose triphenylamine compounds represented by the instant formulae (CT-9) and (CT-6), respectively, but they are not synthesized according to the claimed invention.

Applicants therefore submit there is no prima facie case of obviousness because the primary and secondary references, even if combined, fail to meet all of the claimed limitations. As the Examiner admits, the combined references do not teach the critical synthesis route to the instant charge transfer compounds. Sasaki's triphenylamine compound represented by the formula (CT-9) is not synthesized according to the synthesis method particular to the present invention because the use of a palladium compound is absent from Sasaki's synthesis. Consequently, Sasaki's synthesis yields a less pure compound than does the synthesis in the present invention. Likewise, Kikuchi's triphenylamine compound (CT-6) is not synthesized according to the synthesis method particular to the present invention. Consequently, Kikuchi's compound exhibits a higher impurity yield that adversely affects the compound's electrophotographic characteristics and requires a higher purification cost than (CT-6) of the present invention.

In particular, the phosphine catalyst employed in the present invention contains a tert-butyl group and an aryl group, such as the following phosphine compounds given as examples on page 11 of the specification for the subject invention: (P-1), (P-2),

(P-3), (P-5), (P-6), (P-7), (P-8), (P-11), (P-12), (P-14) and (P-15). The Tables on pages 15 and 16 below compare Examples 1-6, which utilize all claimed limitations, with Comparative Examples 1-6 and 11-16, which substitute other catalysts for the instant phosphine catalyst. Compounds (P-6), (P-1), (P-6), (P-6), (P-7) and (P-8) are used as the phosphine catalysts in Examples 1-6, respectively. Comparative Examples 1-6 do not use a phosphine catalyst or palladium compound and, instead, use copper powder and potassium carbonate. Comparative Examples 11-16 do not use the phosphine catalysts of the instant invention that have an aryl group and a tert-butyl group and, instead, use tri-*tert*-butylphosphine. Results for Examples 1-6 and Comparative Examples 1-6 and 11-16 are shown hereafter for (CT-1), (CT-3), (CT-5) and (CT-6) for the following illustrated properties: dark potential (Vd), light potential (Vl), and residual potential (Vr) at the initial stage as well as after 30,000 operations.

The criticality of the phosphine catalyst and the palladium compound used in the subject invention is evident from the higher values obtained for dark potential and lower values obtained for light potential and for residual potential in the instant invention examples in contrast to the Comparative Examples as shown in the following synopsis Table 4 of the specification.

Example No.	Charge Transfer Compound	Synthetic Example No.	Initial Characteristics			Change in Potential (30,000th - Initial)				P Content* (ppm)
			Vd (-V)	VI (-V)	Vr (-V)	ΔVd (-V)	ΔVI (-V)	ΔVr (-V)		
Example 1	CT-1	Synthetic Example 1	702	195	10	0	15	10	12	
Example 2	CT-1	Synthetic Example 2	700	200	15	0	15	10	15	
Example 3	CT-3	Synthetic Example 3	695	195	10	5	15	5	10	
Example 4	CT-3	Synthetic Example 4	700	198	5	5	15	5	18	
Example 5	CT-5	Synthetic Example 5	700	200	10	3	10	5	15	
Example 6	CT-6	Synthetic Example 6	698	200	10	3	5	0	8	
Comparative Example 1	CT-1	Comparative Synthetic Example 1	695	200	30	20	45	30	-	
Comparative Example 2	CT-1	Comparative Synthetic Example 2	690	200	35	20	50	25	-	
Comparative Example 3	CT-3	Comparative Synthetic Example 3	693	210	30	18	45	30	-	
Comparative Example 4	CT-3	Comparative Synthetic Example 4	695	206	30	25	48	30	-	
Comparative Example 5	CT-5	Comparative Synthetic Example 5	694	203	35	24	48	25	-	

Example No.	Charge Transfer Compound	Synthetic Example No.	Initial Characteristics			Change in Potential (30,000th - Initial)			P Content* (ppm)
			Vd (-V)	VI (-V)	Vr (-V)	ΔVd (-V)	ΔVI (-V)	ΔVr (-V)	
Comparative Example 6	CT-6	Comparative Synthetic Example 6	687	200	30	17	40	30	-
Comparative Example 11	CT-1	Comparative Synthetic Example 11	695	202	35	15	40	20	70
Comparative Example 12	CT-1	Comparative Synthetic Example 12	700	200	30	10	35	30	65
Comparative Example 13	CT-3	Comparative Synthetic Example 13	702	200	25	15	40	25	60
Comparative Example 14	CT-3	Comparative Synthetic Example 14	705	200	20	20	35	30	72
Comparative Example 15	CT-5	Comparative Synthetic Example 15	700	198	35	10	38	35	75
Comparative Example 16	CT-6	Comparative Synthetic Example 16	698	195	30	14	42	32	70

\* The Pd content was measured by fluorescent X-ray analysis.

The Examiner argued that Sasaki's triarylamine Compound 220, although admittedly made by an entirely different process, is said to have excellent durability and, therefore, is the same as Applicants' corresponding compound. That conclusion is not based on scientific analysis, but merely on subjective characterization of results and is unsupportable.

Sasaki admittedly teaches only corona charging, see Col. 1, lines 23-25; Col. 99, line 65; Col 105, line 17 and Col 107, line 40. The invention of Sasaki was tested in a corona charging apparatus, not a contact charger. In the different-in-kind environment of corona charging, the triarylamine compound utilized apparently exhibited satisfactory results. However, there is no reason to believe such results are transferable to a contact charging environment which creates far different problems. Applicants' test results show it is crucial to synthesize using the phosphine and palladium compounds.

The presence of a palladium catalyst is a key feature of the present invention, as disclosed on page 8 of the instant specification. Applicants believe that the catalytic mechanism in the present invention is that the palladium atom coordinated with the phosphine compound works as a ligand and forms an oxidative adduct with the aryl halide. Then, the halogen is eliminated and the palladium atom is simultaneously coordinated with the aryl amine. Finally, the palladium catalyst is reductively eliminated from the amine to form the triarylamine.

Furthermore, the criticality of using palladium is confirmed by the prior art of record. In "Palladium-Catalyzed Amination of Aryl Iodides," John P. Wolfe and Stephen L. Buchwald note that 1.5% Pd<sub>2</sub>(dba)<sub>3</sub> is required to achieve 100% conversion of the aryl iodides to aniline derivatives. *J. Org. Chem.*, 1996, 61, 1133-1135. Likewise, in another prior art article, "A Highly Active Catalyst for Palladium-Catalyzed Cross-



Coupling Reactions: Room-Temperature Suzuki Couplings and Amination of Unactivated Aryl Chlorides,” David W. Old, John P. Wolfe and Stephen L. Buchwald demonstrate that using the highly active 2/Pd(0) palladium catalyst system allows for the room temperature amination of aryl bromides, allows for the first example of a room-temperature amination of an aryl chloride, and functions as the first general catalyst for room-temperature Suzuki coupling reactions of aryl chlorides. *J. Am. Chem. Soc.*, 1998, 120, 9722-9723. It is further disclosed in footnote 8 of the article that control experiments in the absence of palladium produced unsatisfactory results of no coupled products after twenty four hours at room temperature. *Id.* at 9722, fn 8.

Sasaki, on the other hand, in columns 6-7, teaches a reaction without palladium. As noted in the instant specification and in the prior art articles, the resulting product in a reaction without a palladium compound will lack the requisite purity. From a comparison of Sasaki’s effective filing date of 1983 and of the prior art articles’ publication dates of 1996 and 1998, it is evident that the crucial presence of palladium was unknown when Sasaki was filed and that Sasaki did not contemplate the presence of palladium. Thus, there is no prima facie case of obviousness from Ohkubo combined with Sasaki because, even when combined, these references fail to meet all of the claimed limitations of the instant invention.

Likewise, Kikuchi ‘809 requires a corona charger during copying operations. See Col. 10, lines 10-11, 40-44; Col. 11, lines 30-32 and Col. 15, lines 33-35. In Col. 11, line 60, Kikuchi discloses use of a copying machine (NP-3525) manufactured by Canon, Inc., the present assignee. This is a corona charging device. In the attached informal translation of JPP 05-60859, the NP-3525 copier is identified as a corona charger. Accordingly, the Examiner’s conclusion that the Kikuchi compound (19) has excellent

durability and possesses other charging characteristics is only in the context of corona charging. Whatever success the compounds had in corona charging is no predictor of its effects with a contact charger which presents an entirely different set of problems.

Further, the Kikuchi compound was synthesized by an Ullmann reaction using a copper catalyst (see Kikuchi, col. 7, lines 29-40). An Ullmann reaction is not the synthetic route employed in the present claimed invention, but rather is the synthetic route used in Comparative Examples 1-10 of the instant specification. The properties of the Kikuchi compounds would tend to be different from the instant compounds because the Ullmann reaction requires a large amount of copper catalyst, a high reaction temperature, and a prolonged reaction time. Thus, this reaction results in low arylamine yield and forms byproducts, such as colored impurities and decomposition products, which adversely affect electrophotographic characteristics, and thus require a higher purification cost. The synthesis of arylamines in the instant invention is in the presence of a catalyst including a phosphine and palladium compound. Since the reaction proceeds under a relatively mild condition, the impurity yield is significantly low compared to the impurity yield in the Ullmann reaction employed in Kikuchi. See instant specification, page 3, line 20 - page 4, line 15.

A comparison between the characteristics of the (CT-6) compound in instant Example 6 and in instant Comparative Example 6, which uses a copper catalyst like Kikuchi, further illustrates the difference between instant (CT-6) and Kikuchi's compound (19). The initial dark potential, light potential and residual potential for instant Example 6 are 698V, 200V and 10V, respectively. The corresponding potential values for instant Comparative Example 6 are 687V, 200V and 30V. The higher dark potential value and lower light potential and residual potential values in instant Example 6 confirm that the

synthesis of charge transfer compounds using the phosphine and palladium compounds of the present invention can suppress the formation of impurities causing variations in potentials and yields high-purity products. See specification, page 31, lines 1-8. Thus, Kikuchi's compound (19), indeed, does not have similar properties to instant (CT-6). There is no prima facie case of obviousness from Ohkubo combined with Kikuchi because, even when combined, these references fail to meet all of the claimed limitations of the instant invention.

Not only is there no prima facie case of obviousness, but neither Sasaki nor Kikuchi can be relied upon by the Examiner because, as a matter of law, there is no motivation to combine the references of Ohkuba with Sasaki or Kikuchi. The Federal Circuit has stated that "[i]n order to rely on a reference as a basis for rejection of the applicant's invention, the reference must either be in the field of the applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." See In re Deminski, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986).

The Federal Circuit has admonished the PTO to consider the reality of circumstances - in other words, common sense, in deciding where an artisan would reasonably be expected to look when seeking to solve a specific problem. In re Oetiker, 977 F.2d 1443 (Fed. Cir. 1992). One of ordinary skill in seeking to solve a contact charging problem would not be motivated to look in corona charging devices. Ohkubo is classified in 355/211, while Sasaki in 430/73 and Kikuchi in 430/73. Accordingly, even the PTO agrees the respective fields are non-analogous and the problems are different.

The Sasaki and Kikuchi references are not analogous to the current invention or Ohkubo because they do not relate to contact charging. A key characteristic of the present claimed invention is good electrophotographic performance in a contact

charging system. Sasaki and Kikuchi employ a corona charging system.

Corona charging belongs to a different field of endeavor and encounters different problems than contact charging. In a contact charging system, as noted above, potential problems exist when the high voltage charging means contacts the electrophotographic photosensitive member and may cause non-uniform charging and pinholes in the drum. In contrast, in a corona charging system, potential problems exist when the space charging means causes unwanted ozone formation in the charged area and the like.

Thus, as a matter of law, there is no motivation to combine Ohkubo, which employs a contact charging system, with Sasaki or Kikuchi, which employ a corona charging system.

Finally, as shown in the synopsis Table of comparative test results provided above, the claimed invention provides unexpectedly superior results compared to systems in which, for example, a different phosphine catalyst is employed or in which a copper catalyst system is utilized. The present comparative tests are closer than Ohkubo and demonstrate the criticality of a claimed feature not disclosed in Ohkubo.

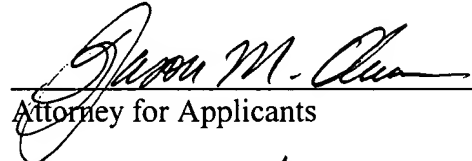
The Examiner queried as to whether the laser beam printer LBP-950 made by Canon is a contact charger and whether the NP-3255 (sic) [3525] device in Kikuchi is a corona charger. Applicants have presented objective evidence that the NP-3525 device is a corona charger. A Declaration executed by the inventor, Takakazu Tanaka, is enclosed herewith in which he declares that the LBP-950 copier used in the instant Examples is an apparatus employing contact charging.

In view of the foregoing amendments and remarks, Applicants respectfully request entry of the amendment as reducing the issues, favorable reconsideration and early

passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

  
Attorney for Applicants

Registration No. 48,512

FITZPATRICK, CELLA, HARPER & SCINTO  
30 Rockefeller Plaza  
New York, New York 10112-3801  
Facsimile: (212) 218-2200

NY\_MAIN 339516v1